

Case 3300***Halipegus occidualis* Krull, 1935 and *Halipegus eccentricus* Thomas, 1939 (Digenea, HEMIURIDAE): proposed conservation of the specific names**

Donald F. McAlpine

New Brunswick Museum, 277 Douglas Avenue, Saint John, New Brunswick, Canada E2K 1E5 (e-mail: donald.mcalpine@nbm-mnb.ca)

Abstract. The purpose of this application, under Article 23.9.3 and Recommendation 23A of the Code, is to conserve the specific names of *Halipegus occidualis* Krull, 1935 and *Halipegus eccentricus* Thomas, 1939 for two species of hemiurid digeneans known to parasitize ranid frogs and various freshwater pulmonate snails. The names are threatened by two senior names, the homonym *Halipegus occidualis* Stafford, 1905 and the synonym *Cercaria projecta* Willey, 1930.

Keywords. Nomenclature; taxonomy; Digenea; HEMIURIDAE; *Halipegus occidualis*; *Cercaria projecta*; *Halipegus eccentricus*; *Halipegus projecta*; Gastropoda; *Helisoma anceps*; Amphibia; RANIDAE; *Rana catesbeiana*; *Rana clamitans*; parasitic worms; North America.

1. Stafford (1905, p. 687) described the hemiurid parasite *Halipegus occidualis* on the basis of 37 specimens collected from the 'mouth' of the bullfrog *Rana catesbeiana* Shaw, 1802 from eastern Canada. Previously Stafford (1900, p. 409) had misidentified the species as *Halipegus ovocaudatum* (Vulpian, 1859), but in that paper he was more specific about the site of collection within the host, stating that his collections came 'more frequently from the eustachian tubes, in a fold along the inner edge of the jaw bone, at the entrance of the posterior nares and round the entrance to the oesophagus. In one frog I lately found 11 specimens of this worm chiefly at the entrance and even deep in the eustachian tube and at the entrance of the oesophagus'. Stafford (1900) also states "I have not yet seen [*D. ovocaudatum*] . . . under the tongue." Clearly, Stafford was looking for *Halipegus* under the tongue and did not find it there. However inadequate Stafford's (1905, p. 688) description was, he also noted that the egg filament lengths on which he based his description were 'about' 56 μm , a detail later to prove of significance. Stafford (1905) did not designate type material or figure the species, although a recently discovered specimen of *Halipegus* from the Stafford Collection now in the Canadian Museum of Nature, Ottawa (CMNP 1900-1629) was probably used in the course of preparing the description and should therefore be considered a syntype.

2. The specimen (CMNP 1900-1629) bears the remains of an original University of Toronto label identifying it as *Distomum ovocaudatum* and a replacement label states it was collected from *Rana catesbeiana*. Stafford (1900) listed his address as the Biological Department, University of Toronto, whereas by 1905 Stafford was writing from McGill University, Montreal, supporting the supposition that this specimen is one of the 37 worms on which Stafford (1905) based his description of *Halipegus*

occidualis. The specimen is 3.4 mm in length and 0.92 mm at greatest width, within the range of measurements reported by Stafford (1905) in his description. Nine egg filament lengths I was able to measure are 47 μm , 47 μm , 48 μm , 48 μm , 48 μm , 49 μm , 50 μm , 52 μm and 53 μm . These measurements are clearly incomplete; as McAlpine and Burt (1998) noted, it is virtually impossible to get precise egg filament measurements from mounted *Halipegus* in utero. Nonetheless, it is obvious that the egg filaments in CMNP 1900–1629 are of the short filament type and cannot be confused with the egg filaments of 160–200 μm reported by Krull (1935).

3. Krull (1935, p. 129), recognizing the inadequacies of Stafford's (1905) description, redescribed, figured and worked out the life cycle of worms he believed were *Halipegus occidualis* Stafford, 1905. Krull (1935, p. 135) collected the worms on which he worked from 'under the tongue of a large green frog, *Rana clamitans*' from Maryland and reported egg filaments of 160–200 μm . However, due to the inadequacy of Stafford's (1905) description and the detail provided by Krull (1935), the latter description has provided the basis for usage of the name *H. occidualis* for a parasite possessing long-type egg filaments found under the tongue of frogs (Goater, Mulvey & Esch, 1990; Zelmer & Esch, 1999). Although, Krull's (1935) material is no longer extant, material deposited in the United States National Parasite Collection by D.A. Zelmer (Zelmer & Esch, 1999) has been identified as *H. occidualis* on the basis of the description by Krull (1935). I therefore here designate one of these specimens (USNPC 087687.00) as the neotype of *H. occidualis* Krull, 1935.

4. Thomas (1939, p. 207) described, figured, and worked out the life cycle of *Halipegus eccentricus*, which he believed was distinct from *H. occidualis* Stafford, 1905, on the basis of worms collected from wild-caught *R. catesbeiana* and *R. clamitans* Latreille, 1801 from Michigan and laboratory-reared *Rana pipiens* Schreber, 1782. Thomas (1939, p. 208) reported that adult worms were collected from the eustachian tube of frogs and had an egg filament length of 56–58 μm . Therefore, from the original description, *Halipegus eccentricus* seems to be essentially identical with the nominal species *H. occidualis* (see Stafford, 1900, 1905). The holotype designated by Thomas (1939, p. 208) is in the United States National Parasite Collection, Henry A. Wallace Beltsville Agricultural Research Centre near Washington, D.C. (USNPC 9203). Adult worms of North American species of *Halipegus* are virtually indistinguishable although their cystophorus cercariae are unique. However, adults of *H. occidualis* (sensu Krull, 1935) and *H. eccentricus* Thomas, 1939 may be separated on the basis of molecular methods, site of infection and length of egg filaments (Goater, Browne & Esch, 1990; Goater, Mulvey & Esch, 1990). Not surprisingly, the matter has become confused in that workers have widely followed the description by Thomas (1939) and have applied the name *H. eccentricus* to worms with a short egg filament taken from the eustachian tubes of frogs (e.g. Ameel, Cort & Van Der Woude, 1949; Goater, Mulvey & Esch, 1990; Guilford, 1961; Wetzl & Esch, 1996a, 1996b, 1997; Zelmer & Esch, 1999).

5. Since these *Halipegus* species mature under the tongue or in the eustachian tubes of the definitive amphibian host, both worm and host can be examined in the field and released unharmed. For this reason, these digeneans have offered unique opportunities to link host behavioural ecology with parasite population dynamics. North American *Halipegus* species have been the focus of numerous recent research projects (Crews & Esch, 1986; Shostak & Esch, 1990a, 1990b; Fernandez & Esch,

1991a, 1991b; Wetzel & Esch, 1996a; Esch, Wetzel, Zelmer & Schotthoefer, 1997; Zelmer & Esch, 1998; Zelmer, Wetzel & Esch, 1999) and undoubtedly will be the subject of such studies in the future. The description of *H. eschi* Zelmer & Brooks 2000, from Costa Rica, and the recent discovery of this species in Mexican frogs, further emphasizes the importance of resolving the current usage of the names of North American *Halipegus*.

6. McAlpine & Burt (1998) published the new combination *Halipegus projecta* (Willey, 1930) for the species Krull (1935) identified as *H. occidualis*. Krull (1935, p. 131) also suggested that his worms might well be the same species described and figured as *Cercaria projecta* in the cercarial stage by Willey (1930, p. 481) from the pulmonate snail *Helisoma anceps* (Menke, 1830); McAlpine & Burt (1998) agreed. No type material of *C. projecta* seems to exist and the name had been unused until it was resurrected by McAlpine & Burt (1998). Although I still believe, with Krull (1935), that *C. projecta* is likely to be a senior synonym for *H. occidualis* sensu Krull (1935), due to the absence of type material and inadequacies in the original description by Willey (1930), the nominal species *Cercaria projecta* cannot be identified without doubt. In the interests of avoiding further confusion within the genus *Halipegus*, the name should be suppressed as a nomen dubium.

7. McAlpine & Burt (1998), contrary to the then prevailing usage (e.g. Ameal, Cort & Van Der Woude, 1949; Crews & Esch, 1986; Fernandez & Esch, 1991a; Jones, 1956; Goater, Browne & Esch, 1990; Goater, Mulvey & Esch, 1990; Guilford, 1961; Shostak & Esch, 1990a; Wetzel & Esch 1997; Zelmer, Wetzel & Esch, 1999), followed the Principle of Priority for North American species of *Halipegus*. Zelmer & Esch (1999) objected, stating that such a proposal undermined nomenclatural stability within the genus. Nonetheless, Zelmer & Esch (1999, p. 159) further confused the matter by reporting that the name *H. occidualis* remained unstable for lack of a name-bearing type and suggested that Stafford's original description was a composite of more than one species. They then attempted to stabilize the name by describing characters of the terminal genitalia of adult specimens selected in the cercarial stage on the basis of the description provided by Krull (1935).

8. The nomenclatural history of North American *Halipegus* species is confusing. Neither McAlpine & Burt (1998) nor Zelmer & Esch (1999), in spite of their efforts, have reduced this confusion. Conservation of the name *Halipegus occidualis* Krull, 1935 as a then new nominal species and suppression of the names *H. occidualis* Stafford, 1905 as a senior homonym of doubtful identity and *Cercaria projecta* Willey, 1930, as a nomen dubium, would allow application of the name *H. occidualis* Krull, 1935 to worms with long-type egg filaments parasitic under the tongue of frogs. The name *Halipegus eccentricus* Thomas, 1939 could then be applied to those worms with short-type egg filaments inhabiting the eustachian tubes of frogs, thereby conserving prevailing usage. The case is referred to the Commission under Article 23.9.3 and Recommendation 23A of the Code.

9. The International Commission on Zoological Nomenclature is accordingly asked:

(1) to use its plenary power:

(a) to suppress for the purposes of both the Principle of Priority and the Principle of Homonymy the name *occidualis* Stafford, 1905, as published in

the binomen *Halipegus occidualis*, and all uses of the name prior to that by Krull (1935);

- (b) to suppress for the purposes of the Principle of Priority but not for those of the Principle of Homonymy the name *projecta* Willey, 1930, as published in the binomen *Cercaria projecta*;
- (2) to place on the Official List of Specific Names in Zoology the following names:
- (a) *occidualis*, Krull, 1935, as published in the binomen *Halipegus occidualis*;
- (b) *eccentricus* Thomas, 1939, as published in the binomen *Halipegus eccentricus*;
- (3) to place on the Official Index of Rejected and Invalid Specific Names in Zoology the following names:
- (a) *occidualis* Stafford, 1905, as published in the binomen *Halipegus occidualis*, and as suppressed as in (1) (a) above;
- (b) *projecta* Willey, 1930, as published in the binomen *Cercaria projecta*, and as suppressed as in (1) (b) above.

Acknowledgements

I wish to thank Ms Judith Price, Invertebrate Section, Canadian Museum of Nature, Ottawa, for making specimens available to me and for her great patience as I very slowly worked over an early draft of this material. Dr Derek Zelmer was kind enough to comment on the manuscript.

References

- Ameel, D.J., Cort, W.W. & Van Der Woude, A. 1949. Germinal development in the mother sporocyst and redia of *Halipegus eccentricus* Thomas, 1939. *Journal of Parasitology*, **35**: 569–578.
- Crews, A.E. & Esch, G.W. 1986. Seasonal dynamics of *Halipegus occidualis* (Trematoda: Hemiuridae) in *Helisoma anceps* and its impact on the fecundity of the snail host. *Journal of Parasitology*, **72**: 646–651.
- Esch, G.W., Wetzel, E.J., Zelmer, D.A. & Schotthoefler, A.M. 1997. Long-term changes in parasite population and community structure: a case history. *American Midland Naturalist*, **137**: 369–387.
- Fernandez, J. & Esch, G.W. 1991a. Guild structure of larval trematodes in the snail, *Helisoma anceps*: patterns and processes at the individual host level. *Journal of Parasitology*, **77**: 528–539.
- Fernandez, J. & Esch, G.W. 1991b. The component community structure of larval trematodes in the pulmonate snail *Helisoma anceps*. *Journal of Parasitology*, **77**: 540–550.
- Goater, T.M., Browne, C.L. & Esch, G.W. 1990. On the life history and functional morphology of *Halipegus occidualis* (Trematoda: Hemiuridae), with emphasis on the cystophorous cercaria stage. *International Journal of Parasitology*, **20**: 923–934.
- Goater, T.M., Mulvey, M. & Esch, G.W. 1990. Electrophoretic differentiation of two *Halipegus* (Trematoda: Hemiuridae) congeners in an amphibian population. *Journal of Parasitology*, **76**: 431–434.
- Guilford, H.G. 1961. Gametogenesis, egg-capsule formation, and early miracidial development in the digenetic trematode *Halipegus eccentricus* Thomas. *Journal of Parasitology*, **47**: 757–764.
- Jones, A.W. 1956. The chromosomes of a species of *Halipegus* Loos, 1899 (Digenea: Hemiuridae). *Journal of the Tennessee Academy of Science*, **31**: 186–187.
- Krull, W.H. 1935. Studies on the life history of *Halipegus occidualis* Stafford, 1905. *American Midland Naturalist*, **16**(2): 129–143.
- McAlpine, D.F. & Burt, M.D.B. 1998. Taxonomic status of *Halipegus* spp. (Digenea: Derogenidae) parasitic in the mouth and eustachian tubes of North American and

- Mexican amphibians. *Journal of the Helminthological Society of Washington*, **65**: 10–15.
- Shostak, A.W. & Esch, G.W.** 1990a. Temperature effects on survival and excystment of cercariae of *Halipegus occidualis* (Trematoda). *International Journal of Parasitology*, **20**: 95–99.
- Shostak, A.W. & Esch, G.W.** 1990b. Photocycle-dependent emergence by cercariae of *Halipegus occidualis* from *Helisoma anceps*, with special reference to cercarial emergence patterns as adaptations to transmission. *Journal of Parasitology*, **76**: 790–795.
- Stafford, J.** 1900. Some undescribed trematodes. *Zoologische Jahrbücher, Abteilung für Systematik, Geographie, und Biologie*, **13**: 399–414.
- Stafford, J.** 1905. Trematodes from Canadian vertebrates. *Zoologischer Anzeiger*, **28**: 681–694.
- Thomas, L.J.** 1939. Life cycle of a fluke, *Halipegus eccentricus* n.sp. found in the ears of frogs. *Journal of Parasitology*, **25**: 207–221.
- Wetzel, E.J. & Esch, G.W.** 1996a. Seasonal population dynamics of *Halipegus occidualis* and *Halipegus eccentricus* (Digenea: Hemiuridae) in their amphibian host, *Rana clamitans*. *Journal of Parasitology*, **82**: 414–422.
- Wetzel, E.J. & Esch, G.W.** 1996b. Influence of odonate intermediate host ecology on the infection dynamics of *Halipegus* spp., *Haematolechus longiplexus*, and *Haematolechus complexus* (Trematoda: Digenea). *Journal of the Helminthological Society of Washington*, **63**: 1–7.
- Wetzel, E.J. & Esch, G.W.** 1997. Intrapopulation dynamics of *Halipegus occidualis* and *Halipegus eccentricus* (Digenea: Hemiuridae): Temporal changes within individual hosts. *Journal of Parasitology*, **83**: 1019–1024.
- Willey, C.H.** 1930. A cystophorous cercaria, *C. projecta* n.sp. from the snail, *Helisoma antrosa*, North America. *Parasitology*, **22**: 481–489.
- Zelmer, D.A. & Esch, G.W.** 1998. Bridging the gap: the odonate naiad as a paratenic host for *Halipegus occidualis*. *Journal of Parasitology*, **84**: 94–96.
- Zelmer, D.A. & Esch, G.W.** 1999. Reevaluation of the taxonomic status of *Halipegus occidualis* Stafford, 1905 (Digenea: Hemiuridae). *Journal of Parasitology*, **85**: 157–160.
- Zelmer, D.A., Wetzel, E.J. & Esch, G.W.** 1999. The role of habitat in structuring *Halipegus occidualis* metapopulations in the green frog. *Journal of Parasitology*, **85**: 19–24.

Acknowledgement of receipt of this application was published in BZN 60: 262.

Comments on this case are invited for publication (subject to editing) in the *Bulletin*; they should be sent to the Executive Secretary, I.C.Z.N., Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).